

# (12) UK Patent Application (19) GB (11) 2 294 235 (13) A

(43) Date of A Publication 24.04.1996

(21) Application No 9520437.6

(22) Date of Filing 06.10.1995

(30) Priority Data  
(31) 9420900 (32) 17.10.1994 (33) GB

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(51) INT CL<sup>6</sup>  
B65H 19/10, B32B 7/06, C09J 7/02

(52) UK CL (Edition O)  
B5N N0706 N182 N183 N184 N208 N207 N224 N226  
N252 N2900 N434 N445X N480 N494 N563 N543 N644  
N648 N658 N695 N735 N757 N758 N781  
B8R RRG1 R8B2 R8B3 R8G1X R8G3D  
U1S S1594

(56) Documents Cited  
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(58) Field of Search  
UK CL (Edition O) B5N  
INT CL<sup>6</sup> B32B 7/06, B65H 19/10, C09J 7/02  
ONLINE:WPL/CLAIMS

## (54) Joining of coiled stock

(57) A nose tab for temporarily interconnecting the leading and trailing ends (34, 37) of the outermost turn (36) of a coil of sheet material, wherein said nose tab has a first layer to be in use adhesively attached to the under-surface of said leading end, and the nose tab is characterised in that it has a second layer to be in use adhesively attached to said trailing end and/or to the leading end (39) of the next-to-outermost turn (38), and in that the first and second layers are bonded to one another across their mutually abutting faces in a manner permitting them to be peelably separable in use. Double sided adhesive tape (40) may adhere trailing "inner" end (44) of the old coil and leading outer end (34) of the new coil.

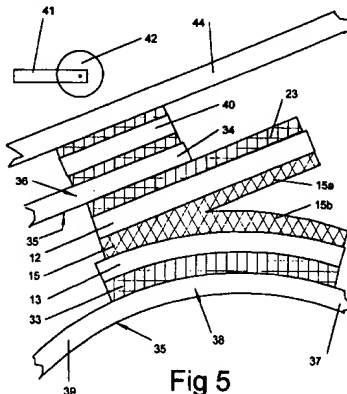


Fig 5

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

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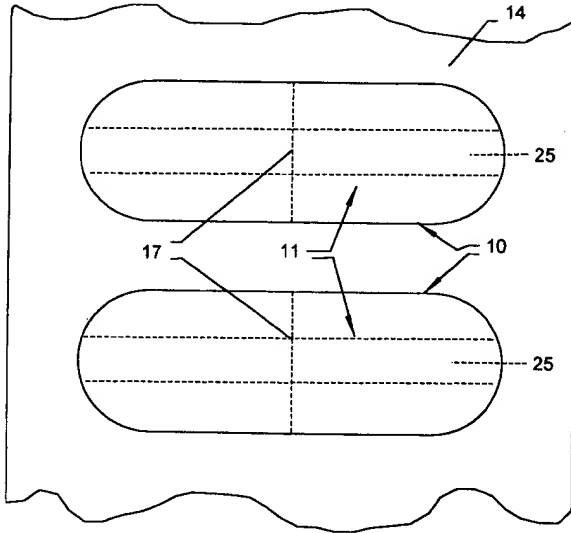


Fig 1

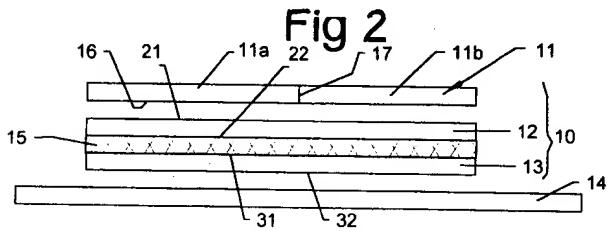


Fig 2

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Fig 3

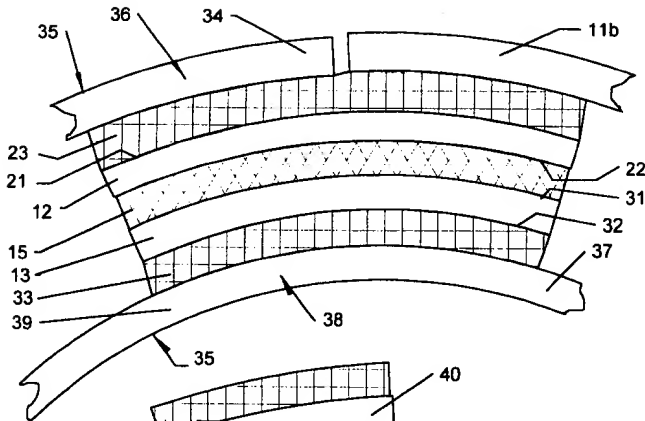
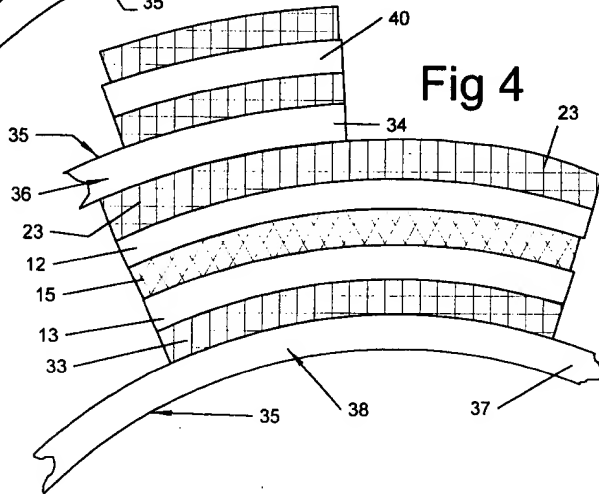
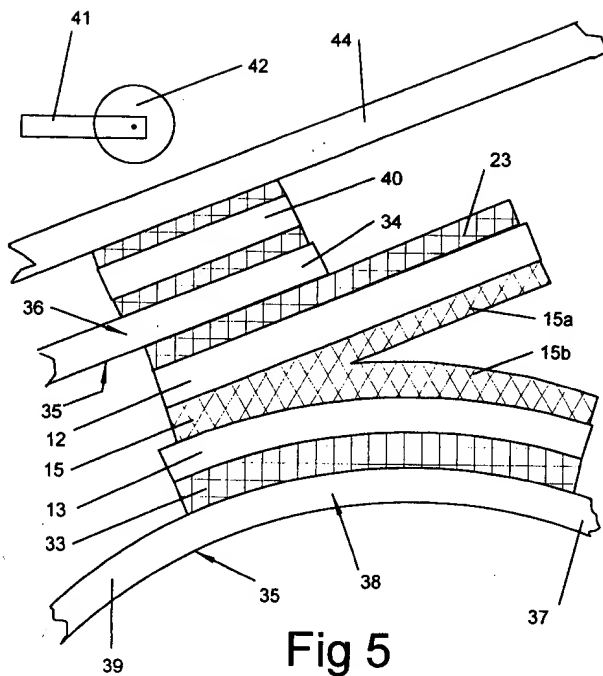


Fig 4



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IMPROVEMENTS RELATING TO THE JOINING OF COILED STOCK

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DESCRIPTION

This invention relates to the joining of coiled stock. Particularly, but not exclusively, the invention is concerned with the joining of coils of newsprint paper during newspaper production.

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It is known in continuous production from coiled sheet material stock to provide arrangements whereby the trailing, inner, end of the coil being used and depleted is joined to the leading, outer, end of a new coil. For continuity of production, this joining has to be performed so that there need be no break in the continuous production process. In one method - as used for example with coils of newsprint paper - the new coil, with its outer end suitably prepared inter alia with adhesive tapes, is swung bodily towards the path of the "inner" end of the depleting coil (i.e. that being used), the new coil is rotated until its outer rotational speed matches the linear speed of the paper from the depleting coil, and then these outer and "inner" ends are brought into surfacial overlapping abutment and are mutually adhered by the adhesive tapes on the new coil's leading end.

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The preparation of the new coil's outer end may include a so-called nose tab which is positioned to overlap the leading or forward edge of the new coil's outermost turn and temporarily interconnect it to the trailing end of said outermost turn of the new coil. The temporary nature of this interconnection has in the past been effected by providing slits or perforations whereby the nose tab is

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readily frangible at, or closely adjacent to, said forward edge.

5 One form of frangible nose tab, known from UK Patent Specification No. 1451197, has two parallel lines of perforations directed longitudinally of the nose tab. In use, such a nose tab sometimes forms a flap or pocket which can fill with air and permit the flap to become caught up in the subsequent production machinery and cause damage and/or breakdowns in production. Such disadvantages are  
10 almost wholly avoided by use of the frangible nose tab disclosed in UK Patent Publication No. 2257931.B which comprises slits directed along lines conforming substantially to first and second V's having their apices similarly directed longitudinally of the nose tab and their  
15 opposite ends spaced apart at four locations, two of these four locations being outermost and closely adjacent to the side edges of the nose tab such as to be readily and frangibly connectable to said side edges, and the other two  
20 of these four locations being adjacent one another and such as to be readily and frangibly interconnectable.

It will be appreciated that the mutually adhered, surfacially overlapping, "inner" and outer ends from  
25 respectively the depleting and new coils form a region of double-layer newsprint and that this thickness is further increased by the thickness of the interconnecting nose tab. With newsprint coils it becomes important - for high quality assurance - to minimise the thickness of this  
30 surfacially overlapping zone. However the frangible nose tab cannot be over-reduced in thickness since, due to its perforations or slits, it will then be too weak to hold the leading edge of the outermost turn firmly adhered to the trailing end of that outermost turn.

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It is considered desirable to overcome or at least minimise one or more of the above mentioned and/or other problems of the prior art.

5 According to a first aspect of this invention there is provided a nose tab for temporarily interconnecting the leading and trailing ends of the outermost turn of a coil of sheet material, wherein said nose tab has a first layer to be in use adhesively attached to the under-surface of  
10 said leading end, and the nose tab is characterised in that it has a second layer to be in use adhesively attached to said trailing end and/or to the leading end of the next-to-outermost turn, and in that the first and second layers are bonded to one another across their mutually abutting faces  
15 in a manner permitting them to be peelingly separable in use.

The bond between the first and second layers is weaker than the bond between the first layer and said under-surface,  
20 and is weaker than the bond between the second layer and said trailing end. Accordingly separation of the first and second layers can be accomplished very easily - i.e. by even a very small peeling away force directed transversely to the plane of the nose tab - although the whole area of  
25 the nose tab resists the usual shear forces arising from attempts by the new coil to unwind and, with the present invention, acting between the said layers.

Preferably the outer, non-mutually-abutting faces of the  
30 first and second layers are pre-coated with adhesive which, prior to use, serves to mount the nose tab by one outer face in a peelingly removable fashion on a backing sheet or strip (e.g. of Kraft paper) and by the other outer face in a removable fashion on a backing sheet or strip under a  
35 cover (e.g. of Kraft paper).

5 According to a second aspect of this invention there is provided a method of preparing the leading, outer, end of a new coil of sheet material for joining to the trailing "inner" end of a depleting coil being used in continuous production, said method including the steps of:

10 (a) adhesively attaching to the new coil a nose tab according to said first aspect of the invention, such that part of the nose tab's said first layer is adhered to the underside of the leading end of the new coil's outer turn, and its said second layer overlies and is adhered to the  
15 trailing end of the new coil's outer turn and/or the leading end of the new coil's second (i.e. next-to-outer) turn; and

(b) adhesively attaching two lengths of double-sided adhesive tape to said leading end of the new coil's outer  
20 turn such that said lengths of tape extend at angles from the new coil's opposite side edges to the nose tab.

Preferably the method includes the further step of:

(c) adhesively attaching one or more further lengths  
25 of double-sided adhesive tape to said leading end and such as to extend substantially parallel to the coil's side edges. Optionally the said further length, or at least one of the said further lengths, of adhesive tape extends to overlie the nose tab.

30 It will be appreciated that the adhesive tapes serve not only for adhering the new coil's outer end to the "inner" end of the depleting coil in use, but also increase the overall strength of the nose tab.

35 The two angled (first-mentioned) adhesive tapes that extend to the side edges of the new coil's outer turn, form two



generally triangular side zones. These are torn off (e.g. using the angled tapes as guides) to provide a coil leading end of substantially arrow-head form.

- 5 By way of example one embodiment of this invention will now be described with reference to the accompanying drawings of which:
- Figure 1 is a plan view of part of a strip of nose tabs of the embodiment,
- 10 Figure 2 is a schematic exploded side view in the direction of arrow 11 of Fig 1,
- Figure 3 is a view similar to Figure 2 showing the embodiment in use attaching the leading edge of the new coil's outermost turn to the trailing end of the new coil's outermost turn and the leading
- 15 end of the new coils second (i.e. next to outermost) turn,
- Figure 4 is a view similar to Figure 3 showing the embodiment in use with the new coil prepared for adhesive connection to the depleting end section of an old coil, and
- 20 Figure 5 is a view similar to Figure 4 showing the embodiment in use with the depleting end section of the old coil adhesively attached to the outermost turn of the new coil and the nose tab layers peeling away from one another.
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As shown in Figure 1, a plurality of nose tabs 10 are adhesively supported upon a waxy backing strip 14 (e.g. of Kraft paper) in a manner which enables the nose tabs 10 to be readily peeled off the strip 14 for use. The strip 14, carrying the nose tabs 10, can be supplied in rolled-up form. Each nose tab 10 (see Fig. 2) comprises first, second and third layers 11, 12 and 13. The first layer 11 has a

30 smooth waxy under surface 16 and thus serves as a readily removable front cover. A transverse cut 17 is provided through layer 11 so as to divide layer 11 into two sections

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11a and 11b. The second layer 12 is of thin paper provided on its upper surface 21 with a strong water-based adhesive 23 (Fig 3). The under surface 22 of layer 12 is bonded to the upper surface 31 of layer 13 in a manner permitting ready separation by progressive peeling apart of the layers 12,13 but resisting separation forces applied to the layers 12,13 as a whole. One form of bonding material that may be used for achieving this is a UV-curing silicone-release lacquer applied to the under-surface 22 of layer 12 or to the upper surface 31 of layer 13 or to both surfaces 22,31. This lacquer bond (schematically shown and referenced 15 in Figs 2-5) has a "dry peel" effect such that when the bond breaks down - upon progressive peeling apart of the layers 12,13 - the surfaces 22,31 are each left in a non-adhesive and dry-to-the-touch state. The layer 13 is of thin paper and is provided on its under surface 32 with a strong water based adhesive 33.

The nose tabs 10 of this embodiment are for use with coils of newsprint paper, specifically to bond the leading end of a new coil's outermost turn securely to the trailing end of that turn and/or to the leading end portion of the next-to-outermost turn of the coil. This bond is to be maintained by the nose tab 10 until such time as the leading end of the new coil's outermost turn becomes adhesively bonded to the "inner" end of an old coil of newsprint paper being depleted by a continuous newspaper production process.

For such use, a nose tab 10 is removed from off the back strip 14 and one section 11a of first layer 11 is removed from the nose tab 10 to reveal the adhesive coating 23 on the upper surface 21 of the nose tab's layer 12. The visible, adhesive-coated surface 21 is inserted under the leading end 34 of the outermost turn 36 of a new coil 35 of newsprint paper, and the nose tab 10 pressed firmly down by manual pressure applied to the leading end 34 and to the still-present section 11b of layer 11 (see Fig. 3).

Adhesive 23 bonds leading end 34 to the nose tab's mutually bonded layers 12,13 and, via adhesive 33, to the trailing end 37 of the coil's outermost turn 36 (located below section 11b) and to the leading end 39 of the coil's next-to-outermost second turn 38 (of which leading end 39 is located below leading end 34). With the two outermost turns 36,38 of the coil 35 thus bonded to one another by the nose tab 10, the protective first layer section 11b may be then removed to reveal the adhesive coating 23 on the exposed portion of layer 12 (Fig 4).

The new coil 35 is then further prepared or "dressed" by applying double-side adhesive tapes 40 (Fig 4) to the outer surface of the leading end 34 of the coil's outermost turn 36. Two such tapes 40, e.g. 1m in length, extend from the nose tab 10 to the opposite side edges of the coil 35 to provide a generally V-shape. These two tapes 40 in effect form - with the coil's sides and leading edge 34 - the "hypotenuses" of two generally triangular side or corner zones at the leading end 34 of the coil's outermost turn 36. Using these two angled lengths of tape 40 as guides, the two side/corner zones are then torn off to provide the coil's leading end 34 with a substantially arrow-head shape that is fronted by the nose tab 10.

The coil changing apparatus of the newspaper production line comprises a pair of sidearms together swingable about an axis directed centrally thereof. A pair of trunnions is provided at each end of the pair of arms such as to support rotatably, at one said end, a coil of newsprint that is in use (i.e. is being continuously run and depleted), and to support rotatably, at the other said end, a new coil that is to have its outer end joined to the "inner" end of the depleting coil.

The new coil, prepared as aforesaid, is loaded between the trunnions at the said other end of the pair of sidearms (of

the coil changing apparatus). These sidearms are then swung about the said axis so as to move the new coil from the new coil loading station to a joining station located adjacent the delivery path of the sheet paper being drawn off from the depleting coil currently in use. The new coil is rotated about the axis of its supporting trunnions and brought up to a peripheral speed commensurate with the linear speed of the sheet paper from the depleting coil.

As shown in Fig 5, when the depleting coil has little paper left wound about its inner core - a circumstance sensed by the coil's weight falling to a predetermined low level - and the leading end of the new coil is in appropriate rotational position - sensed by an electrical sensor - a so-called pasting arm 41 is moved pivotally such that a roller 42 thereon engages the paper sheet 44 travelling linearly from the depleting coil (not shown) through the joining station, and momentarily deflects that sheet 44 against the outermost turn 36 of the new coil 35. The sheet 44 becomes adhesively attached to the exposed part of adhesive layer 23 (and subsequently to the double-sided adhesive tapes 40). As the sheet 44 from the depleting coil continues its path out of the joining station (Fig 5), it therefore pulls with it the leading end 34 of the rotating new coil's outermost turn 36. This imparts a progressive separation (or peeling apart) force upon the layers 12,13 of the nose tab 10 causing those layers to peel apart progressively from another as the bond provided by the lacquer 15 between them breaks down. This is represented in Fig 5 by the splitting of lacquer bond 15 into two parts 15a and 15b.

During this activity, a knife (not shown) on the pasting arm 41 is actuated to cut off paper sheet 44 from the residue of the depleting coil still remaining on the core (of the old coil). The flying splice or join of the two coils is thereby completed and the temporary inter-

connection of the leading and trailing ends 34,37 of the new coil's outermost turn 36 is thus terminated. That outermost turn 36, and each successive one, can then be unwound from the new coil and be drawn linearly through the newspaper production equipment. It will be noted that this "flying splice" or join procedure ensures there is no break in the continuous supply of paper to the printing equipment.

The lacquer layer 15 that provides the peeling apart feature of the nose tab has been found to operate only (or at least with optimum efficiency) if the separation force between the layers is applied at an edge of the layer rather than within the lacquered area. Accordingly, the layer 15 is preferably applied to one or other or both of layers 12,13 in one or more strips extending longitudinally of the nose tab (i.e. transversely of the backing strip 14). This is illustrated in Fig 1 where an unlacquered zone 25 extends as a band from end to end of the nose tab 10 midway between, and parallel to,, the nose tabs side edges. Such a band may for example be approximately 14mm wide and provide a reduction of about 50% in the adhesive hold (or resistance to peeling) by the layer 15. The unlacquered band 25 ensures that there are additional edges from which peeling apart can start if the point of engagement between sheet 44 of the depleting coil and the outermost turn 36 of the new coil 35 is not exactly in line with the end of the nose tab and the leading edge of the lacquer layer 15.

It will be appreciated that the adhesion between the two, spliced together, overlapping layers 34,44 of newsprint paper, i.e. the trailing "inner" end 44 of the old coil and the leading outer end 34 of the new coil, is by means of the double-sided adhesive tapes 40, and the adhesive coating 23 covering surface 21 of nose tab layer 12. Accordingly there are no flaps or other like remnants from the nose tab that are not in adhesive contact with the

trailing sheet portion 14 of the old coil or with portions of the new coil 35. Thus there is no tab portion or the like that can get caught in the subsequent newspaper production equipment and cause damage thereto and/or breakdowns in the continuous production process.

Apart from avoiding unattached flaps and the like, use of the nose tabs 10 allow the tapes 40 to be positioned with less accuracy than heretofore in that they can extend beyond leading end 34 to overlies the revealed coating 23 on surface 21 of nose tab layer 12 or can extend to a little before the front edge of leading end 34. This allows for a saving of time in dressing of the new coil.

In a modification the protective layer portion 11b may be removed after (rather than before) the double-sided adhesive tapes 40 have been applied.

Other modifications and embodiments of the invention will be readily apparent to those skilled in this art without departing from the ambit and scope of the present invention.

**CLAIMS**

1. A nose tab for temporarily interconnecting the leading and trailing ends of the outermost turn of a coil of sheet material, wherein said nose tab has a first layer to be in use adhesively attached to the under-surface of said leading end, and the nose tab is characterised in that it has a second layer to be in use adhesively attached to said trailing end and/or to the leading end of the next-to-outermost turn, and in that the first and second layers are bonded to one another across their mutually abutting faces in a manner permitting them to be peelingly separable in use.
2. A nose tab according to Claim 1 wherein the adhesives employed ensure in use that
- (a) the bond between the first and second layers is weaker than the bond between the first layer and said under-surface, and
  - (b) the bond between the first and second layers is weaker than the bond between the second layer and said trailing end.
3. A nose tab according to Claim 1 or Claim 2, wherein the outer, non-mutually-abutting faces of the first and second layers are pre-coated with adhesive which, prior to use, serves to mount the nose tab by one outer face in a peelingly removable fashion on a backing sheet or strip (e.g. of Kraft paper) and by the other outer face in a removable fashion on a backing sheet or strip under a cover (e.g. of Kraft paper).
4. A nose tab according to any preceding claim wherein the first and second layers are bonded to one another across their mutually abutting faces by a lacquer.

5. A nose tab according to any preceding claim wherein the first and second layers are bonded to one another across their mutually abutting faces by a UV-curing, silicone-release lacquer.

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6. A nose tab according to any preceding claim wherein an unbonded zone is provided between the first and second layers to aid their ability to separate by peeling apart when such action is initiated distal to edges of the nose tab.

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7. A nose tab substantially as herein described with reference to and/or as illustrated in the accompanying drawings.

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8. A method of preparing the leading, outer, end of a new coil of sheet material for joining to the trailing "inner" end of a depleting coil being used in continuous production, said method including the steps of:

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(a) adhesively attaching to the new coil a nose tab according to any one of Claims 1 to 5 such that part of the nose tab's said first layer is adhered to the underside of the leading end of the new coil's outer turn, and its said second layer overlies and is adhered to the trailing end of the new coil's outer turn and/or the leading end of the new coil's second (i.e. next-to-outer) turn; and

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(b) adhesively attaching two lengths of double-sided adhesive tape to said leading end of the new coil's outer turn such that said lengths of tape extend at angles from the new coil's opposite side edges to the nose tab.

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9. A method according to Claim 6 and including the further step of:

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(c) adhesively attaching one or more further lengths of double-sided adhesive tape to said leading end and such



as to extend substantially parallel to the coil's side edges.

5 10. A method according to Claim 7, wherein the said further length, or at least one of the said further lengths, of adhesive tape extends to overlies the nose tab.

10 11. A method according to Claim 7 or Claim 8, wherein the two angled (first-mentioned) adhesive tapes - that extend to the side edges of the new coil's outer turn - form two generally triangular side zones, and these generally triangular side zones are torn off (e.g. using the angled tapes as guides) to provide a coil leading end of substantially arrow-head form.

15 12. A method according to Claim 6 and substantially as herein described with reference to the accompanying drawings.

CLAIMS

1. A nose tab for temporarily interconnecting the leading and trailing ends of the outermost turn of a coil of sheet material, wherein said nose tab has a first layer to be in use adhesively attached to the under-surface of said leading end, and the nose tab is characterised in that it has a second layer to be in use adhesively attached to said trailing end and/or to the leading end of the next-to-outermost turn, and in that the first and second layers are bonded to one another across their mutually abutting faces by a lacquer which permits them to be peelingly separable in use.
2. A nose tab according to Claim 1 wherein the adhesives employed ensure in use that
- (a) the bond between the first and second layers is weaker than the bond between the first layer and said under-surface, and
  - (b) the bond between the first and second layers is weaker than the bond between the second layer and said trailing end.
3. A nose tab according to Claim 1 or Claim 2, wherein the outer, non-mutually-abutting faces of the first and second layers are pre-coated with adhesive which, prior to use, serves to mount the nose tab by one outer face in a peelingly removable fashion on a backing sheet or strip (e.g. of Kraft paper) and by the other outer face in a removable fashion on a backing sheet or strip under a cover (e.g. of Kraft paper).
4. A nose tab according to any preceding claim wherein the said lacquer has a capability to break down and provide a "dry peel" effect when the said first and second layers are separated by peeling apart.

5. A nose tab according to any preceding claim wherein the said lacquer is a UV-curing, silicone-release lacquer.

5 6. A nose tab according to any preceding claim wherein an unbonded zone is provided between the first and second layers to aid their ability to separate by peeling apart when such action is initiated distal to edges of the nose tab.

10 7. A nose tab substantially as herein described with reference to and/or as illustrated in the accompanying drawings.

15 8. A method of preparing the leading, outer, end of a new coil of sheet material for joining to the trailing "inner" end of a depleting coil being used in continuous production, said method including the steps of:

20 (a) adhesively attaching to the new coil a nose tab according to any one of Claims 1 to 5 such that part of the nose tab's said first layer is adhered to the underside of the leading end of the new coil's outer turn, and its said second layer overlies and is adhered to the trailing end of the new coil's outer turn and/or the leading end of the new coil's second (i.e. next-to-outer) turn; and

25 (b) adhesively attaching two lengths of double-sided adhesive tape to said leading end of the new coil's outer turn such that said lengths of tape extend at angles from the new coil's opposite side edges to the nose tab.

30 9. A method according to Claim 6 and including the further step of:

35 (c) adhesively attaching one or more further lengths of double-sided adhesive tape to said leading end and such as to extend substantially parallel to the coil's side edges.

10. A method according to Claim 7, wherein the said further length, or at least one of the said further lengths, of adhesive tape extends to overlies the nose tab.

5 11. A method according to Claim 7 or Claim 8, wherein the two angled (first-mentioned) adhesive tapes - that extend to the side edges of the new coil's outer turn - form two generally triangular side zones, and these generally  
10 triangular side zones are torn off (e.g. using the angled tapes as guides) to provide a coil leading end of substantially arrow-head form.

12. A method according to Claim 6 and substantially as  
15 herein described with reference to the accompanying drawings.